To: DEQ/WQD District Engineers

From: Lou Harmon, Water and Wastewater Section, Program Manager
James Brough, Northwest District Engineer

Subject: Very Low Slope Sewer Variance, Policy 13.9.13

Date: April 2, 2010

The minimum slopes values defined in Chapter XI, were established for clay pipe flowing full to obtain a velocity greater than 2 ft/sec to flush or clean a sewer line of deposited solids. Often on sewer mains with few service taps (e.g., less than 100 residential connections), flow rates are seldom great enough to produce a flushing velocity of at least 2 ft/sec at the regulatory minimum slopes. Sewer lines installed today should have less maintenance needs since most of today's sewer materials consist of smoother material (e.g., PVC rather than clay) with fewer joints (e.g., 20-foot spacing rather than 3-foot spacing).

VARIANCE POLICY

This policy grants approval of very low slope sewers that meet the following conditions:

1. The minimum slope permitted for 8-inch pipe will be .002 ft/ft. The minimum slope permitted for 6-inch pipe will also be .002 ft/ft since the low flow velocities are just as high in a 6-inch pipe as in an 8-inch pipe. The minimum slope for larger than 8-inch pipe will be reviewed on a case-by-case basis, but will not be less than one-half (1/2) of the minimum slopes listed in the Chapter XI, Part B, Section 9.

2. A letter must be provided by the municipality or homeowners association that will operate and maintain the very low slope sewer, indicating their approval of the design.

3. The pipe must be bedded with Type 1 bedding material using Type A trench backfill methods or cement treated fill in accordance with the Wyoming Public Works Standard Specifications, Section 02225.

4. The pipe must be installed using a laser to ensure an accurate and uniform grade..

5. Very low slope sewers are granted a variance under this policy to eliminate the need for a lift station, avoid groundwater and excessive dewatering costs or to replace existing sewers installed at less than minimum regulatory grades. They can also be used to prevent sewer line extensions from 'rising out of the ground' too quickly in flat areas.

6. All very low slope sewers should be installed under the supervision of a full time inspector. Wyoming Public Works Standard Specifications should be adhered to for the testing of sewer lines after installation. Very low slope sewer lines should also be inspected with a camera while water is flowing through the sewer.

Any variance requests not in compliance with this policy must be handled on a case-by-case basis.

History

Very low slope sewers are sewer lines installed at less than the minimum slopes listed in Chapter XI, Part B, Section 9. The WQD has received numerous requests for a variance to the minimum slopes listed.

The main reasons for this variance request are:

1. For replacement of existing sewer lines already installed at less than minimum slopes,

2. The avoidance of lift stations, and

3. To prevent sewer line extensions from 'rising out of the ground' too quickly in flat areas. Historically, very low slope sewer variances have been granted on a case-by-case basis. This policy has been developed to provide for the approval of very low slope sewers that meet the design and construction conditions listed at the end of this policy.

Basis for variance

1. There is substantial out-of-state and in-state experience to support the successful use of very low slope sewer lines.

2. A documented example can be found in The Small Flows Clearing House in West Virginia's "Case Study Number 11 - Erickson, Nebraska, Flat Grade Sewers." This case study along with 80 years experience with very low slope sewers in Nebraska have demonstrated that very low slope sewer lines perform well and have not required noticeably more maintenance than conventional sewers.

3. Two experienced, independent sources reported that main causes for sewer maintenance are:

A. Root and grit intrusion through defective joints, and

B. Low area "saddles" due to settling or improper construction, rather than the installation of very low slope sewer lines.

4. Very low slope sewer lines have benefited several communities by avoiding the initial costs of lift stations and dewatering costs.

5. This policy should also help reduce long term operation and maintenance costs and reduce other factors such as infiltration and hydraulic loading on wastewater treatment systems, especially lagoons.